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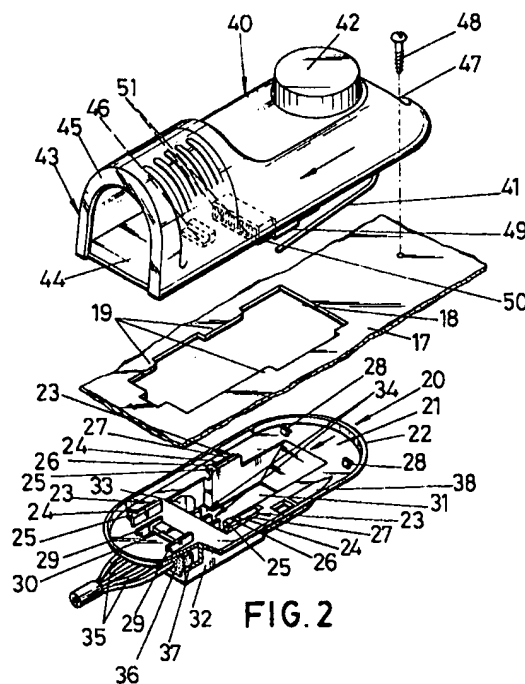
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(54) **Refrigerator**

(57) Refrigerator with a thermal insulated casing (11), formed by an outside covering (15), a thermal insulation layer (16) and an inside covering (17) that delimits the useful space of the refrigerating chamber. A lighting installation (40, 63) to light up the useful space is provided for in the inside covering (17). The inside covering (17) has an opening (18, 18') which is covered by an insertion piece (20, 20') placed in the side of the thermal insulation. The insertion piece is provided with electric connections (34, 65) and with means to fasten the lighting installation (40, 63). The lighting installation is in contact with the electric connections (34, 65).



Description

The invention refers to a refrigerator with a thermal insulated casing, formed by an outside casing or covering, a thermal insulation layer and an inside casing or covering that delimits the useful space of the refrigerator.

In known refrigerators, in order to light up their refrigerating chambers or useful spaces, lighting devices or installations or regulator-light combinations are used. These are retained in a wall of the vessel of refrigerated products by means of the combination of a locking screw with a retaining connection, that acts perpendicularly to the wall of the vessel of refrigerated products. Simultaneously to the fastening or attaching of the lighting installation, this lighting installation is put in electrical contact with a connector that surrounds the electric socket contacts, fastened in the vessel of the refrigerated products. In order to securely guarantee the contact process, on the one hand, and the retaining process, on the other hand, for mass production, it is necessary that the connector fastened in the vessel of refrigerated goods is placed in the vessel of refrigerated goods within relatively narrow margins of tolerance and that the attachment of the lighting installation with the connector allows certain play or overtravel. While the play or overtravel frequently implies formation of an undesired interstice, which makes possible the penetration of condensation water between the lighting installation and the vessel of refrigerated goods, the positioning of the connector within small margins of tolerance not only implies a costly manufacturing cycle, but it may also involve assembly problems of the lighting installation in the event that the connector, due to manufacturing inaccuracies, is not placed within the narrow tolerance range.

On the other hand, in some refrigerators, when the injecting or filling of the layer of thermal insulation material is carried out, it is necessary to introduce a male part or similar element that exerts pressure on the inside covering in order to prevent that, due to the pressure exerted by the thermal insulation material, the inside covering be deformed inwardly. As the feeding cables of the lighting device are hanging and arranged in the space that the male part will occupy, it is necessary to hide said cables by housing them in a cavity established in the inside surface corresponding to the thermal insulation layer. Thus, during the manufacturing process of the refrigerator, the need to introduce a male part, as well as the need for a cavity to hide the feeding cables for the installation and assembly of the lighting device, both steps (introduction of the male part and providing for the cavity) imply an inconvenience, as well as a price rise of the obtained final product.

The purpose of the invention is to propose for the prior art refrigerator according to the preamble of claim 1, a better base for the assembly of the lighting device or installation, to the refrigerator.

According to the invention, this purpose is achieved because the inside covering has an opening, that is covered by a fastening or insertion piece arranged in the side of the thermal insulation, that is provided with electric connections and with means for the fastening of the lighting installation, the lighting installation being in contact with the electric connections.

According to a first preferred embodiment of the invention, the lighting installation is fastened in the insertion piece by means of sliding movement in the direction of the longitudinal axis of the insertion piece.

By means of the solution according to the first preferred embodiment of the invention, a fastening mode and a contact mode for the lighting installation are provided, by means of which it is possible, on the one hand and due to the slide fastening, to obtain a relatively narrow support, therefore essentially free of air interstice, of the casing of the lighting installation in the inside covering. On the other hand, due to this type of fastening support of the lighting installation, a simplified assembly is possible, substantially free from manufacturing tolerances that must be maintained exactly, wherefore the manufacturing cycle is accelerated and the security of the process is increased, given that the insertion piece and the lighting installation almost represent an assembly unit. Besides, by means of the covering action of the insertion piece, it can be prevented that the thermal insulation material, introduced as liquid starting components in the intermediate space between the outside casing or covering and the inside covering, penetrates into the useful space of the refrigerator through the notch or opening that exists in the inside covering. Besides, the support of the casing of the lighting installation in the inside covering offers, during the attachment process and contact process with the insertion piece, a type of guide through which the assembly cycle can be carried out in a substantially more precise and quicker way. Besides, by means of the insertion piece that contains the electric connections, it becomes possible to fasten the insertion piece, already equipped with electric connection lines, to the inside covering in a pre-assembly stage before the foaming process, without additional sealing measures required for the foaming process, with a reduced assembly cost.

According to a preferred embodiment of the object of the invention, it is provided for that the insertion piece is retained in the free edges of the notch by means of a bayonet type locking, whose locking direction extends in the direction of the longitudinal axis of the insertion piece.

By means of the bayonet-type locking, due to the inclined planes that are used in this case for locking purposes, that reduce the locking force, it is guaranteed that the insertion piece only in virtue of the locking movement is supported in a foam-tight manner in the locking position in the inside covering. By means of choosing the locking direction in the direction of the longitudinal axis of the insertion piece, a especially easy-

to-handle locking mechanics is prepared.

The locking of the insertion piece is provided for in an especially convenient manner when, according to a following advantageous configuration of the object of the invention, it is provided for that the bayonet-type locking of the insertion piece is provided for in the edges of the opening that extend in the direction of the longitudinal axis.

The insertion piece can be led to its locking position in an especially easy-to-assemble manner, as to the manufacturing technique and handling technique when, in accordance with another preferred embodiment of the object of the invention, it is provided for that the insertion piece can be led to its locking position in the direction towards the opening of the useful space.

The insertion piece is retained in an especially simple way and in a stable position during the manufacturing cycle when, in accordance with another advantageous configuration of the object of the invention, it is provided for that the insertion piece is retained in positive connection in its locking position and against the locking direction with the help of retaining means.

According to another preferred embodiment of the object of the invention, it is provided for that in the insertion piece, the fastening means of the lighting installation can cooperate in a bayonet manner with retaining means in said lighting installation.

By means of a retaining arrangement of this type for the lighting installation, by virtue of the inclined plane that is used during the bayonet-type locking, the lighting installation can be fastened in a way essentially independent of the tolerance and essentially closely supported on the inside covering. Besides, a retaining arrangement of this type allows rapid and power-saving assembly and disassembly of the lighting installation.

The fastening means of the lighting installation in the insertion piece are configured especially simply and robustly when, in accordance with a further advantageous configuration of the object of the invention, it is provided for that in the insertion piece the fastening means of the lighting installation are configured like at least one individual retaining clamp, with which a retaining projection in the lighting installation can cooperate, in positive connection and/or friction connection with regard to the longitudinal axis of the insertion piece.

In accordance with another preferred embodiment of the object of the invention, it is provided for that the insertion piece has a longitudinal extended cavity, arranged in the direction of the longitudinal axis of the insertion piece, directed towards the thermal insulation, in one of whose ends is provided a housing bag open on both sides in the direction of the longitudinal axis, which permits retention of a connector, provided with contact elements that act as electric connections, hermetically along the outside contour of said connector.

This kind of fastening or retention of the electric connections in the insertion piece, placed in an exact position, that prevents penetration of liquid thermal

insulation material, allows especially rapid and functionally safe electric contacting of the lighting installation during the fastening process. Besides, by means of the housing bag, an especially simple, robust and easy-to-assemble fastening support for the connector that contains the electric connections, is prepared.

In accordance with another preferred embodiment of the object of the invention, it is provided for that the insertion piece has an elastic sealing lip, placed circumferentially, that is supported with sealing effect on the inside covering in the area of the edge of the opening.

By means of an insertion piece configured in this way, it rests in a foam-tight manner without additional sealing arrangements, solely through its locking process in the inside covering.

The electric contacts are retained in a specially simple manner and in a secure position in the lighting installation when, in accordance with another advantageous configuration of the object of the invention, it is provided for that the lighting installation has a housing, that can retain, in positive connection and/or friction connection, a retaining element equipped with spring contacts, insertable at least partially in the housing bag.

The reflector of the lighting installation may be replaced in a specially simple manner when, in accordance with another preferred embodiment of the object of the invention, it is provided for that the lighting installation is provided with a releasably retained reflector. Besides, a fastening support of the reflector of this type enables use of reflectors of different materials and with a different shape, whereby, for example, the lighting installation may be reequipped inexpensively with incandescent lamps with different emission power.

A fastening support without barriers and security of the lighting installation is achieved when, in accordance with another preferred embodiment of the object of the invention, it is provided for that the lighting installation can be blocked in the insertion piece in its blocking direction.

According to a second embodiment of the invention, the insertion or fastening piece is immobilized in the side of the thermal insulation in the inside covering, leaving free in the thermal insulation a housing space similar to a casing for a lampholder. The insertion or fastening piece penetrates the opening through the inside covering at least by sectors, and surrounds the opening sealing it. The fastening piece can have a contact piece holding a contact element, with which the lampholder is connectable from the refrigerating chamber. The contact piece may be connectable to the fastening piece. The lampholder may be detachably insertable in the fastening piece. The lampholder may be surrounded by a reflector element that is immobilized, in the side of the refrigerating chamber, detachably in the inside covering. The reflector element can be connected with the lampholder in a single piece. A lamp cover formed at least partially translucently can be detachably immobilized in the reflector element.

Preferably, the insertion or fastening piece is coupled in a circular opening established in the inside covering, most of said fastening piece remaining housed occupying a small space of the layer of insulation material. For the assembly of the fastening piece, it is first introduced through the circular opening of the inside covering and then it is slightly turned. The fastening piece has a ring-shaped rim that is pressed against the inside surface of the inside covering and some ring-shaped fins that are in contact with the other surface of said inside covering. The circular opening has some small cuts or radial notches complementary to the ring-shaped fins in order to facilitate the insertion of the fastening piece, as well as the blocking of the same when the final turn of said piece has been carried out. The fastening piece is arranged to receive a lighting installation that comprises a lampholder that is anchored to the same, and is provided with some connection perforations of feeding terminals of the electric current or energy, which are established in a bottom piece fixed to the fastening piece. The lighting installation of this second embodiment, also has an reflector element that includes a tubular extension that remains inserted between the fastening piece and the lampholder. The fastening of the reflector element is ensured by a screw that screws in a tubular stub integral to an extension of the fastening piece.

The invention is explained in detail in the following description with the help of the preferred embodiments represented in the following drawings. In this case:

Figure 1 shows a perspective view of a home refrigerator that includes a lighting installation or device of the useful space of the refrigerator.

Figure 2 shows a partial exploded perspective view of a first embodiment of the invention.

Figure 3 shows a partial exploded perspective view of a second embodiment of the invention.

Figure 4 shows a section view of the unit represented in the previous figure.

Figure 1 shows a home refrigerator (10) with various temperatures, comprising a thermal insulated casing (11), inside of which are provided three refrigerating compartments with different temperatures. The highest compartment is configured as a freezer compartment (12), the lowest one is configured as a cellar compartment (13) and the compartment arranged between these two is configured as a normal refrigerating compartment (14). Each one of the compartments can be closed by a door that is supported elastically on the edge of the opening of the casing (11). The casing (11) has an outside covering (15), a layer of thermal insulation (16) that follows it and an inside covering (17), applied in a single piece by means of deep embossment of a plastic plate, which extends over the three refrigerating compartments and that forms together, with the outside covering (15), an intermediate space for the

insertion of the layer of thermal insulation (16). A lighting installation explained in a more exact manner hereinafter is retained in the inside covering (17).

According to a first preferred embodiment of the invention, shown in figure 2, the inside covering (17) is provided, for the purpose of fastening, with an opening (18) configured essentially as a rectangle, in whose longest opposite parallel sides, which extend in the direction of the longitudinal axis thereof, are arranged projections (19) that are projected into the open area of the opening (18). Opening (18) is covered towards the layer of thermal insulation (16), with a sealing effect, by an insertion piece (20) configured with a shell shape, manufactured for example as a diecast plastic piece. The bottom of the shell (21) of the insertion piece is provided on its free edges with an elastically formable sealing lip (22), that is supported on the inside covering (17), in the area of the edge of the opening (18), with a sealing when a certain tension is exerted thereon. To retain the insertion piece (20), in the bottom of the shell (21), in the side areas in the direction of the longitudinal axis thereof, are provided some retaining projections (23), that are placed in the bottom of the shell (21) in correspondence with the arrangement of the projections (19). The retaining projections (23) have annular cross sections. The arms of the angle (24) placed parallel to the bottom of the shell (21) have first an insertion section (25), then an inlet section (26), configured as an inclined plane, and then a fastening area (27). Next to the retaining projections (23) are provided retaining projections (28) and (29), placed in pairs on the narrowest sides of the shell (21), that may cooperate with the narrow sides of the opening for retention by positive connection of the insertion piece (20) in the inside covering (17), and in and against the locking direction. The retaining projections (29) are connected to a retaining rib (30) placed at a distance over the bottom of the shell (21). A cavity (31) that extends in the direction of the longitudinal axis of the insertion piece (20) is provided for in the bottom of the shell, between retaining projections (28) and (29). This cavity has, in its narrow side directed towards the retaining projections (29), a housing bag (32) in which is releasably retained an electric connector (33), whose contact elements (34), that serve as electric connections are projected into the cavity (31) and are in contact with electric lines (35). The lines are peripherically retained by an elastic sealing element (36), which in the assembled state of the connector (33) is arranged inside the housing bag (32) and the periphery of which comprises an elastic sealing lip (37), that may cooperate, with foam-tight effect, with the corresponding wall of the housing bag (32). Aside from the housing bag (32), the insertion piece (20) is also equipped with a guide channel (38), that serves to house and guide in sections a sensor tube (41) that belongs to the regulator-light combination (40), said tube being assigned to a constant regulator not shown, provided for in the area close to the door of the regula-

tor-light combination (40), that is equipped with a rotatable adjustment button (42) for the purpose of regulating the temperature inside the normal refrigerating compartment (14). Facing the rotatable adjustment button (42), the regulator-light combination has, in its section distant from the door a lighting installation (43), that comprises a reflector (44) arranged in a replaceable manner in the bottom of the lighting installation and an incandescent lamp not represented in the present case, surrounded by a transparent cover (45). The lighting installation (43) has in the rear outside side, opposite the reflector (44), a retaining hook (46) whose free end is directed in the direction opposite the rotatable adjustment button (42). Opposite the retaining hook (46), a housing hole (47) for insertion of a locking screw (48) is provided for in the area close to the rotatable adjustment button (42). Between the retaining hook (46) and the housing hole (47), under the bottom of the lighting installation (43), is provided a housing (49) in which is releasably retained a retaining element (50) in the form of a connector, within which are arranged spring contacts that serve for the electric contact, that are in contact with the electric lines that lead, on the one hand, towards the incandescent lamp, and, on the other hand, towards the constant regulator.

To fasten the regulator-light combination (40) in the inside covering (17), in a first assembly stage immediately after the manufacturing of the opening (18), the insertion piece (20) is fastened in the inside covering (17). In this case, the insertion piece (20), preassembled with the connector and with the electric line (36) connected to the same, is placed with its retaining elements (23) with relation to the opening (18) in such a way that the retaining elements (23) are placed with their insertion section (25) in front of the projections (19). For fastening, the insertion piece (20) moves in the direction of the arrow (towards the opening of the normal refrigerating compartment 14), whereby the insertion sections (25), then the inlet sections (26) and finally the fastening areas (27) of the retaining elements (23) are coupled in the way of bayonet locking with the projections (19). In this case, the correct locking position, wherein the sealing lip (22) is supported with sealing effect on the outside surface of the inside covering in the side of the foam in the marginal area of the opening (18), is determined by the stop of the back of the retaining projections (29) in the narrow side of the opening (18) directed towards the same. In this position, the retaining projections (28) also provided with an inlet bevel impinge with retaining effect on the inside covering (17), in such a way that by means of the retaining elements (23) in combination with the retaining projections (28) and (29), the insertion piece (20) is retained in the locking direction as well as perpendicular to it. After the fastening of the insertion piece in the inside covering (17), the retaining arrangement is prepared for the regulator-light combination (40), in such a way that this combination may be fastened, for example after the

foaming process of the casing (11), in the inside covering (17). For this purpose, the retaining element (50) equipped with the spring contacts (51) can be placed at a distance in front of the connector (33), being arranged in this position the constant regulator within the cavity (31) and the retaining hook (46) being placed with its free end in front of the retaining rib (30). By means of the sliding movement of the regulator-light combination (40) along the inside covering (17) in the direction of the arrow, simultaneously with the grip of the retaining rib (30) by the retaining hook (46), a fitting of the retaining element (50) with the connector (33) takes place, whereby the lighting installation and the constant regulator are in contact with the electric lines (35). For the definitive fastening of the regulator-light combination (40) in the inside covering (17), the locking screw (48) is introduced in the housing hole (47) and is threaded in the inside covering (17).

In a second preferred embodiment of the invention (figs. 3 and 4), an insertion or fastening piece (20') that fits in correspondence with the perimetric edge of a circular opening (18') established in the inside covering (17), has been provided for. Said piece (20') remains housed in correspondence with the layer of thermal insulation material (16). Unlike the first embodiment, in this second one, the fastening piece (20') is inserted in the circular opening (18') carrying out its assembly, first by means of movement perpendicular to the surface of the circular opening (18') and then turning it.

For this purpose, the perimetric edge of the circular opening (18') has some cuts or radial notches (60) complementary to some small angular fins (61) established outside a circular neck (62) corresponding to the mouth of the fastening piece (20'), in which the lighting installation will be subsequently introduced. In this case the lighting installation is in the form of a lamp holder (63) provided with a pair of connection perforations (64) for housing some electric current or energy feeding terminals (65), the same being located in a bottom piece (66) attached to the fastening piece (20'). The lamp holder has some hooking flanges (67) for housing in some small partitions (68) that form part of the fastening piece (20').

This fastening piece (20') also has a ring-shaped rim (69) established around the circular neck (62) and under the small angular fins (61), in such a way that once the fastening piece (20') has been assembled, previously facing the angular fins (61) with the notches (60), the rim (69) thereof will remain in contact with the external surface of the inside covering (17), while the angular fins (61) will remain at the other surface of the inside covering (17), corresponding to the useful space of the refrigerator. At what regards the final turn of the fastening piece (20') after the insertion in the circular opening (18'), said turn will be limited by one part of the edges of the small radial notches (60), against which the angular fins (61) will knock. In this way, the fastening piece (20') will remain correctly fastened to the edges of

the circular opening (18'), preventing movements in any direction. Besides, this piece (20') will be kept immobilized even with more security, thanks to the layer of insulation material (16) in which the piece remains imbedded.

The ring-shaped rim (69) that knocks against and sits on the inside surface of the inside covering (17), this rim totally seals the circular opening (18') that communicates the useful space of the refrigerator with the inside space occupied by the layer of thermal insulation material (16). On the other hand, a reflector element (70) arranged around the lampholder (63) immobilized in the side of the useful space of the refrigerator in correspondence with the inside covering (17), has been provided for.

The reflector element (70) includes a tubular extension (71) where the lampholder (63) is introduced, at the same time that the free edge of said tubular extension (71) has a perimetric wing (72) where one part of the lampholder (63) is adjusted. Besides, the tubular extension (71) of the reflector element (70) fits coaxially in the inside of the fastening piece (20').

The fastening of the reflector element (70) is assured by means of a screw (73) that screws in a cylindrical-tubular stub (74) that forms part of an extension (75) integral to the ring-shaped rim (69) connected to the fastening piece (20'). One part of this stub (74) remains fit in a hole (76) made in the inside covering (17).

Finally, a lamp cover (77) that has at least one part translucent, the same having some means for fastening to the reflector element (70), has been provided for. These means simply consist of some small flanges (78) that hook in the edge of the reflector element (70).

Claims

1. Refrigerator with a thermal insulated casing (11), formed by an outside covering (15), a layer of thermal insulation (16) and an inside covering (17) that delimits the useful space of the refrigerating chamber, a lighting installation (40, 63) being provided in said inside covering to light up the useful space, characterized in that the inside covering (17) has an opening (18, 18') which is covered by an insertion piece (20, 20') placed in the side of the thermal insulation, the insertion piece being provided with electric connections (34, 65) and means for fastening the lighting installation (40, 63), the lighting installation being in contact with the electric connections (34, 65).
2. Refrigerator according to claim 1, characterized in that the lighting installation (40) is fastened in the insertion piece (20) by means of sliding movement in the direction of the longitudinal axis of the insertion piece (20).
3. Refrigerator according to claim 2, characterized in that the insertion piece (20) is retained in the free edges of the opening (18) by means of a bayonet-type locking, whose locking direction extends in the direction of the longitudinal axis of the insertion piece (20).
4. Refrigerator, according to claim 3, characterized in that the bayonet-type locking of the insertion piece (20) is provided for on the edges of the opening (18) that extend in the direction of the longitudinal axis.
5. Refrigerator, according to any of claims 2 to 4, characterized in that the insertion piece (20) is retained in positive connection in its locking position in and against the locking direction with the help of retaining means.
6. Refrigerator, according to any of claims 2 to 5, characterized in that the insertion piece (20) can be led to its locking position in direction towards opening of the useful space (14).
7. Refrigerator, according to any of claims 2 to 6, characterized in that in insertion piece (20), the means for fastening the lighting installation (40) can cooperate in a bayonet manner with retaining means in the lighting installation (40).
8. Refrigerator, according to any of the claims 2 to 6, characterized in that in insertion piece (20), the means for fastening the lighting installation (40) are configured like at least one individual retaining clamp (30), with which a retaining projection (46) in the lighting installation (40) can cooperate in positive connection and/or friction connection, with relation to the longitudinal axis of the insertion piece (20).
9. Refrigerator, according to any of claims 2 to 8, characterized in that the insertion piece (20) has a longitudinally extended cavity (31), arranged in the direction of the longitudinal axis of the insertion piece (20), directed towards the thermal insulation (16), in one of whose ends is provided a housing bag (32) open on both sides in the direction of the longitudinal axis, that allows retention of a connector (33), provided with contact elements (34) that serve as electric connections, hermetically along the outside contour thereof.
10. Refrigerator, according to any of the claims 2 to 9, characterized in that the insertion piece (20) has an elastic sealing lip (22) placed circumferentially, that is supported with sealing effect on the inside covering (17) in the area of the edge of the opening (18).
11. Refrigerator, according to claim 2, characterized in

that the lighting installation (40) has a housing (49), that can retain in positive connection and/or friction connection, a retaining element (50) equipped with spring contacts (51), insertable at least partially in the housing bag (32).

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12. Refrigerator, according to claim 2 or 11, characterized in that the lighting installation (40) is provided with a releasably retained reflector (44).

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13. Refrigerator, according to any of claims 2, 11 or 12, characterized in that the lighting installation (40) can be locked in the insertion piece (20) in its locking direction.

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14. Refrigerator, according to claim 1, characterized in that the insertion piece (20') is fastening piece immobilized in the side of the thermal insulation (16) in the inside covering (17), that leaves free in the thermal insulation (16) a housing space similar to a casing for a lampholder, the fastening piece penetrating the opening (18') through the inside covering (17) at least by sectors and surrounding the opening (18'), sealing it.

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15. Refrigerator, according to claim 14, characterized in that the fastening piece has a contact piece (66) holding a contact element (65), to which contact piece the lampholder (63) can be connected from the refrigerating chamber.

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16. Refrigerator, according to claim 15, characterized in that the contact piece (66) is connectable to the fastening piece (20').

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17. Refrigerator, according to claim 14 or 15, characterized in that the lampholder (63) is detachably insertable in the fastening piece (20').

18. Refrigerator, according to claims 14, 15 or 17, characterized in that the lampholder (63) is surrounded by a reflector element (70) that is immobilized, in the side of the refrigerating chamber, detachably in the inside covering (17).

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19. Refrigerator, according to claim 18, characterized in that the reflector element (70) is connected to the lampholder (63) in a single piece.

20. Refrigerator, according to claim 18 or 19, characterized in that the reflector element (70) is immobilized detachably in the inside covering (17).

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21. Refrigerator, according to any of claims 14-20, characterized in that a lamp cover (77) formed at least partially translucently, is immobilized detachably in the reflector element (70).

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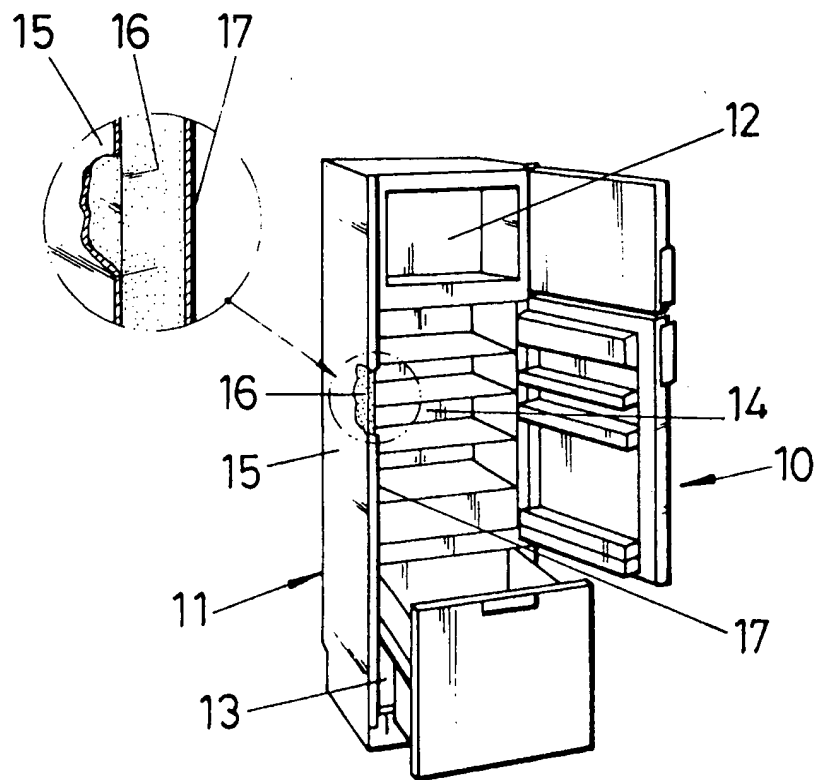


FIG. 1

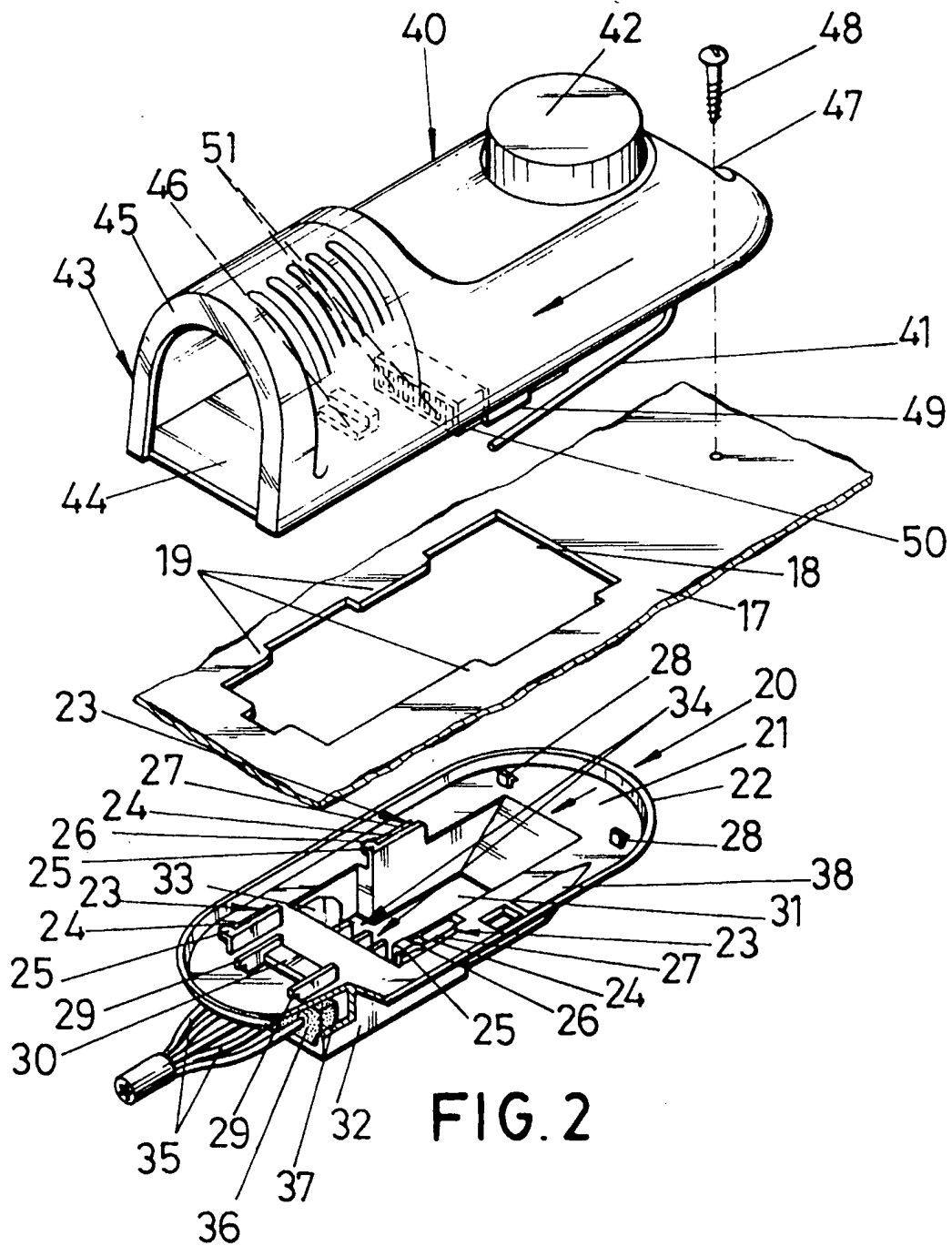


FIG. 2

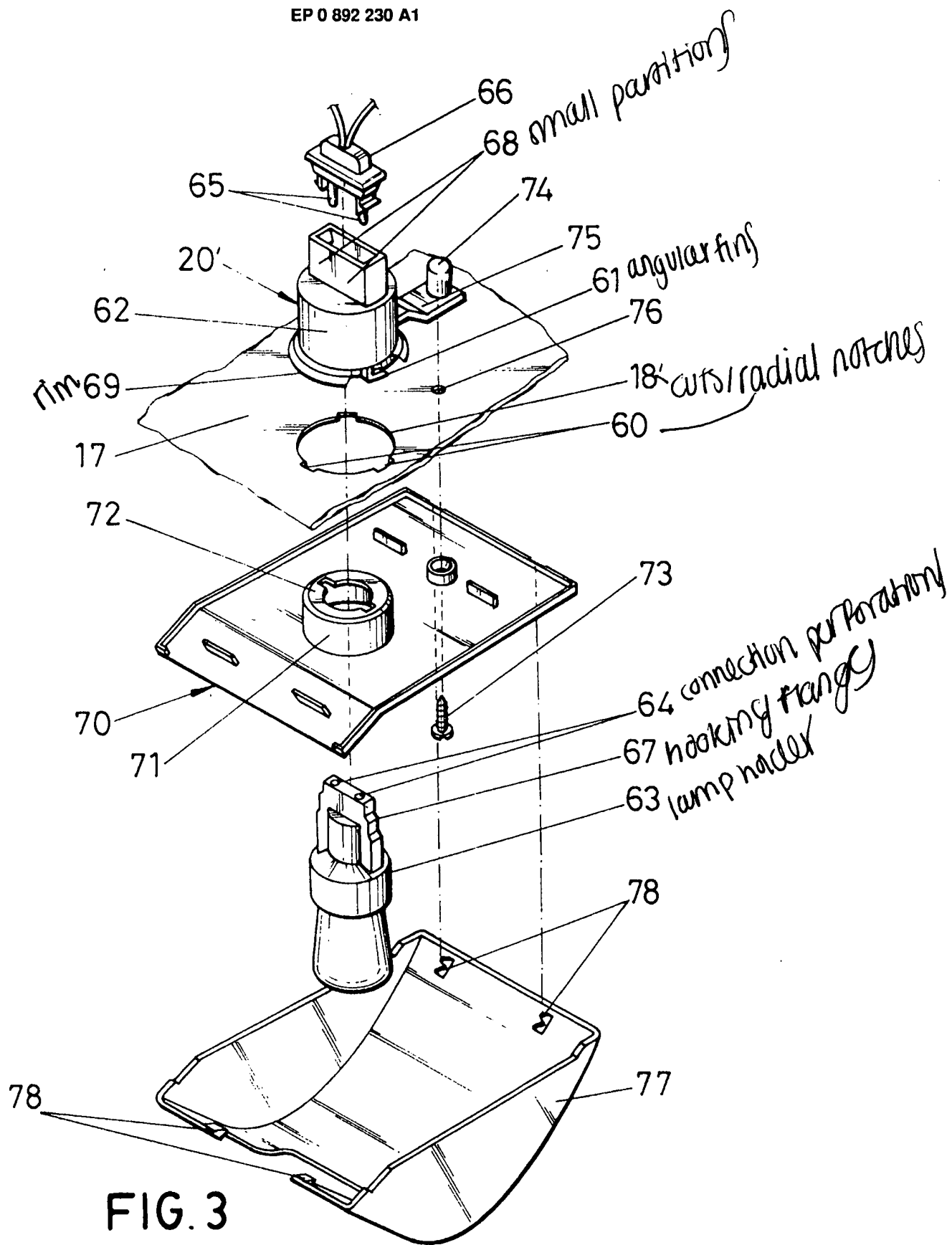


FIG. 3

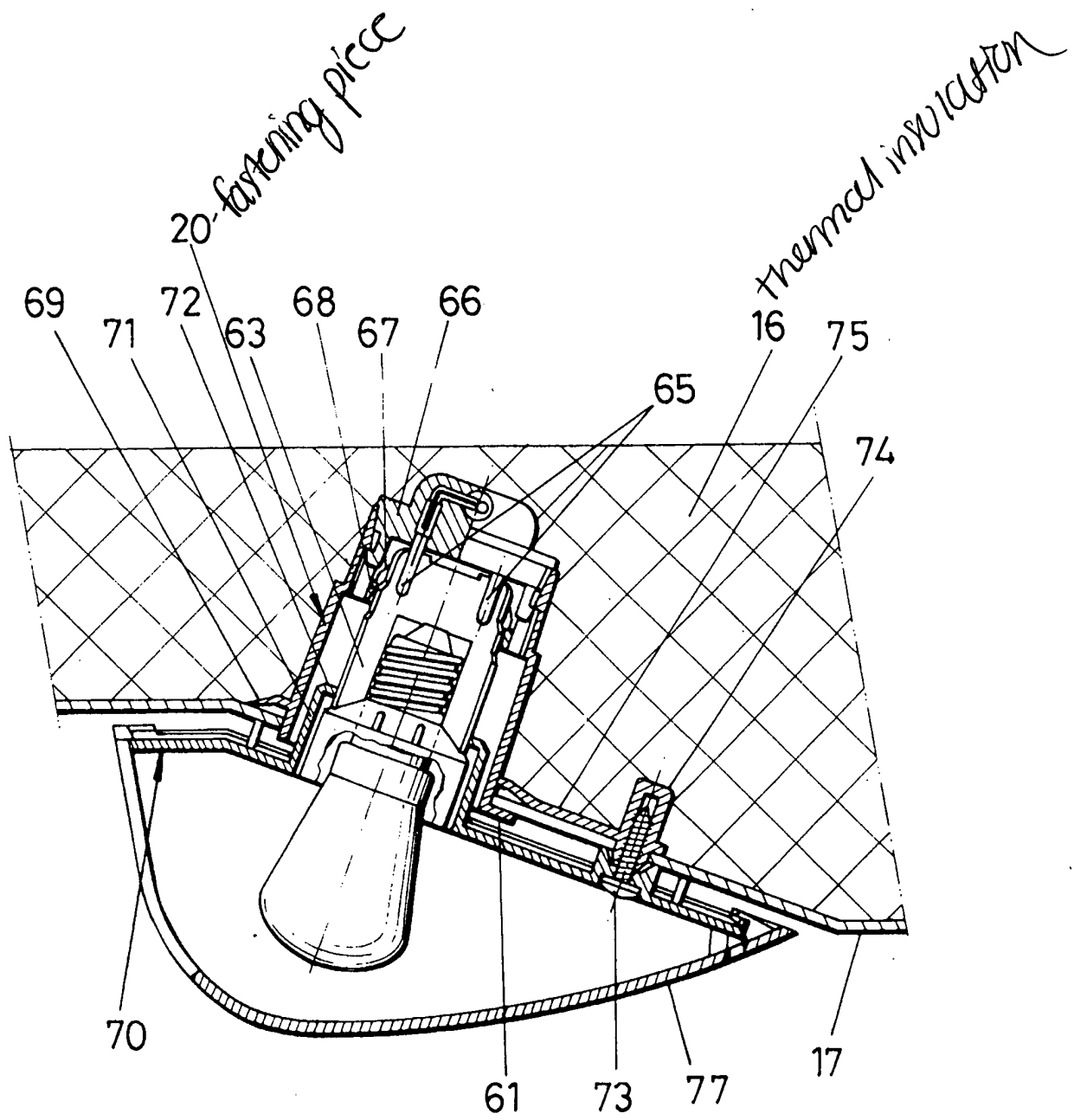


FIG. 4



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 20 2253

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 25 November 1998	Examiner Jessen, F
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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